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# State of Utah

## DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER  
Executive Director

### Division of Oil Gas and Mining

JOHN R. BAZA  
Division Director

### Inspection Report Minerals Regulatory Program

Report Date: September 17, 2007

Supervisor 10024

Mine Name: Bingham Canyon Mine  
Operator Name: Kennecott Utah Copper  
Mr. Rohan McGowan-Jackson, Manager  
8362 West 10200 South  
Bingham Canyon, Utah 84006

Permit number: M/035/002  
Inspection Date: 09132007  
Time: 2:15 PM

Inspector(s): Ms. Beth Ericksen with Ms. Susan White  
Other Participants: Mr. Goeff Bedell, Mr. Chris Kaiser, Mr. Zeb Kenyon, Mr. Kelly Payne,  
(all participants from KUC)

Mine Status: Active

Weather: partly sunny, 80°

Elements of Inspection	Evaluated	Comment	Enforcement
1. Permits, Revisions, Transfer, Bonds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Public Safety (shafts, adits, trash, signs, highwalls)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Protection of Drainages / Erosion Control	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Deleterious Material	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Roads (maintenance, surfacing, dust control, safety)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Concurrent Reclamation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7. Backfilling/Grading (trenches, pits, roads, highwalls, shafts, drill holes)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Water Impoundments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Soils	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10. Revegetation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Air Quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Other	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

#### Purpose of Inspection:

The purpose of the September 13<sup>th</sup> Code 22 waste dump inspection was to examine the dump site and dumping practices and determine if active Code 22 dump construction could have contributed to the July 27<sup>th</sup> erosion event from the adjacent / underlying Yosemite dump which caused the overflow of the storm water collection system.

Also, it is necessary to determine if active Code 22 dumping could influence and increase failure potential resulting in public safety and welfare consequences.

0019





### Inspection Summary:

Elements of Inspection, #'s 3, 6, 9, and 12 have specific comments about each element in the sections below. Generally comments are in: 3, "From point 1 (Code 22 dump)"; 6, "Point 3 (Yosemite dump overlooking the Yosemite drainage system)"; 9, "From point 1 (Code 22 dump) and Point 2 (Intersection of Yosemite Dump and Code 22 Dump)"; 12, all other. We accessed the Code 22 dump area where there was active dumping. We viewed and inspected the area from 3 locations, which are identified on the attached copy of map (figure 4-6 (R3) and labeled as: points 1, 2, and 3, with each point being an approximate location.

From point 1 (Code 22 dump): There was a safety berm, which we climbed to assess the area from this location. The waste material is being dumped at the angle of repose. The waste is being segregated at the mine, and Code 22 material is considered strictly waste. There is a vegetated hillside identified on figure 4-6 (R3) as dark forest green in color. There is some waste material that extends into this hillside area. Mr. Bedell indicated they would use the vegetated material located on the hillside (looking north-east from point 1) as growth medium for future use. We could locate and view the growth material pile that had been collected prior to Code 22 dumping. Mr. Bedell indicated the quantity collected was small, but they put forth considerable effort in obtaining all they could. This growth media pile was located on the north Burma Road area. There is Code 22 dump material contact onto the old Burma Road and Yosemite dump base with sediment fill in the drainage. Ms. White asked how the contact between Yosemite and Code 22 could be contoured to reduce the area of Yosemite dump. Ms. Ericksen inquired about the Code 22 flow system and the base drainage ultimate flow destination. Mr. Payne said it flowed into the Yosemite drainage.

Point 2 (Intersection of Yosemite Dump and Code 22 Dump): This location provided a different view of the active dump area. Ms. White suggested that any material that is supporting growth should be collected and stored for use as future growth media. At this point we were on the Yosemite dump side and there was a recently maintained 'berm' on the crest of Yosemite to minimize sediment flow during a storm event. The berm appeared adequate in size and gradient and was well maintained. The shape of the berm would best be described as a solid right-triangle shape in cross-section, with the crest of the slope being at the dump top. At Code 22 waste material is being dumped from a height where the rock fragments are segregated and the larger fragments roll to the bottom of the dump (affecting unremoved native soils.) This gravity segregation may affect permeability at different levels, but will be dependent on weathering. Ms. Ericksen asked if there had been prior instability in the Burma Road area of which Mr. Bedell said, "the slope isn't going anywhere." Although, Mr. Bedell said the Yosemite dump has an inherently stable configuration since it is buttressed against the native hillside to the north. Due to the lack of information regarding the slope instability history of the immediate area, it remains unclear of the possibility of unstable foundation conditions beneath Code 22 or locales in the adjacent vicinity.

Point 3 (Yosemite dump overlooking the Yosemite drainage system): At this location the entire Yosemite drainage system was viewed. Mr. Kaiser provided an overview of the system and indicated they are working on design optimization. Ms. Ericksen expressed to Mr. Kaiser that the



current system is designed without consideration to dump sediment flow, including slump and debris flow, and that from a Division standpoint, the designs must incorporate the dump material contribution which could easily upset the drainage system if ignored. Mr. Kaiser said he understood the concerns and thought that the energy dissipaters, desilting basins and detention capacity behind the cutoff wall are all designed to capture and minimize sediments. Mr. Bedell pointed out to Ms. Ericksen that there is current slope monitoring and pointed out the field instrumentation. Ms. Ericksen asked how often monitoring took place and Mr. Bedell replied once or twice a month. There was discussion about considering the possibility of investigating experimentation options as part of Kennecott's ongoing activities plans. Ms. White and Ms. Ericksen both suggested looking at more 'cutting edge' and experimental technologies for this particular area instead of the VAM-Gro exercise. Ms. Ericksen indicated that if possible they could consider it before yearly budget deadlines. Mr. Kaiser said that KUC spends far beyond the contractual requirement of 50,000/year (1978 dollars) for experimentation. Mr. Payne commented on the Call and Nicholas, Inc. 2004 study, referring to it as a slope stability study, and Ms. White replied the study was a risk assessment and not a slope stability study. She told Mr. Payne that KUC should expect a Division response to it in the near future. Ms. Ericksen added that among other things, the Call and Nicholas submittal grouped the south dumps into one area, and KUC had committed to providing a detailed investigation for each dump/drainage system; of which the 2004 assessment did not do. Mr. Kaiser asked Ms. Ericksen if she thought the active dumping at Code 22 contributed to increased sediment flow into the Yosemite drainage that contributed to the July 27, 2007 event. She said she didn't believe it had a direct affect on the event of July 27th.

Ms. White asked Mr. Kaiser if KUC has looked into the natural regrade software program that was suggested to Ms. Peacey a few months ago to review for possible KUC use. Mr. Kaiser wasn't aware of it, and indicated he would look into it.

#### Conclusions and Recommendations:

**Regrowth materials:** It is recommended that KUC put forth more effort to collect materials for vegetation media. Mr. Kaiser indicated he would look into the suggested possibilities and provide information and feedback. The small amount of regrowth material that was collected prior to active dumping at Code 22 is surprising. Although, it is understood that collecting topsoil in the area can be difficult due to steep natural slope angles and limited topsoil thickness. Soil thicknesses may be measured in inches (not feet) because of its limited availability. It is recommended that in the future, KUC would include soil mapping and volume determinations. A soil scientist could survey the area and identify all suitable plant growth material. The material should be salvaged and used immediately if available for concurrent reclamation or be placed in an isolated area away from contamination and additional moving. As shown in the image, #33, the dump material is impacting native soils without removal and storage.

**Intersection of Code 22 dump and Yosemite dump:** Since this area ultimately leads into the Yosemite drainage, considerations should be made for increased sediment contribution, which will affect the optimization design(s) for the Yosemite drainage system. It is generally thought that coarse durable materials like quartzite tend to armor a dump face reducing weathering/erosion potential. Since the Code 22 waste rock is relatively coarse and predominantly quartzite, it may be worth considering using the material at Yosemite reduce erosional effects. In addition, if waste material is segregated on the basis of physical attributes as well as chemical, then appropriate construction materials may be made available for placing in key waste dump locations.



**Code 22 dump 'foundation' area:** Because of the indirect response to the question regarding the slope stability history in the area, it is recommended that further inquiry and investigation is required within KUC to determine the area stability history. Although speculative, the concern is that a deep-seated failure of Code 22 dump could contribute loose material easily mobilized by rainfall/storm water, which ultimately may inundate the downstream drainage control system. The Division would like the results of that inquiry and move the discussion forward.

**Code 22 dump contour:** A plan should be established for the final dump face contours for Code 22. Kennecott should consider the use of natural regrade software to plan and design more natural shaped slopes (where possible) in lieu of long and wide linear slopes. Kennecott should investigate the potential of using the Code 22 dump face to mitigate, even if a small amount, the Yosemite dump slope length and smoothness.

**Other information:** (a) The Division will provide written response to the Call and Nicholas, Inc. risk assessment of 2004. (b) The Division would like more information about the current geotech monitoring schedule and scope at Yosemite and Code 22. (c) The Division would like more information about the crest 'berm' maintenance schedule including how often the 'berm' is replaced (if at all). In addition, information about the berm materials, height, and gradient would be informative. (d) The Division would like further information regarding the contributing factors that determine the placement of salvaged growth media and to update Figure 4-6 (R3) showing placement location. (e) KUC ongoing activities plan could possibly include studying the potential growth options on large angle of repose waste dumps (as an example).

Inspector's Signature



Date:

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BE:jo

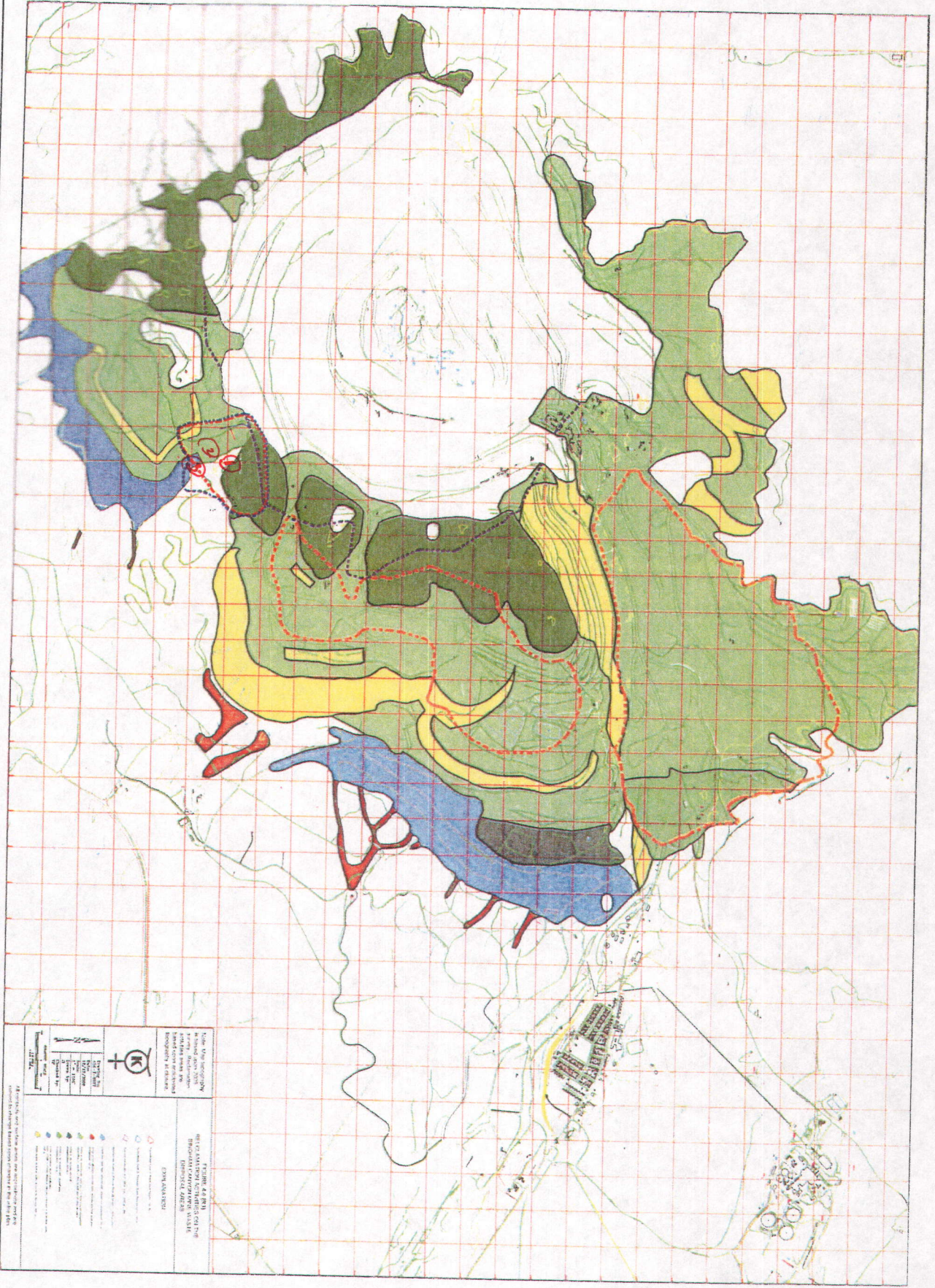
cc: Mr. Chris Kaiser, Kennecott Utah Copper, [KAISERC@KENNECOTT.COM](mailto:KAISERC@KENNECOTT.COM)

Enclosure: Photo # 33 and Location Map









LOCATION MAP